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Holomitrium hawkinsii (Musci: Dicranaceae), A New Species from
Central America, and a Key to *Holomitrium* in Central America

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ABSTRACT. *Holomitrium hawkinsii* differs from all other species in the genus by its dioicous condition with full-sized male and female plants. It is close to *H. pulchellum*, an entire-leaved species of *Holomitrium*, but is a larger plant with longer, more slender leaves that have upper margins obscurely and distantly dentate to spiculate, and lower leaf margins distantly serrulate. A key to the seven species of *Holomitrium* in Central America is given.

In Central America the genus *Holomitrium* (Dicranaceae) is usually found at relatively high elevations growing as an epiphyte on humus mats and the roots of other vascular epiphytes in tree canopies. It also occurs on upper tree trunks and occasionally on humus over boulders. It is acrocarpous and a member of the haplolepidous series of mosses. On account of its short capsule neck, papillose and irregularly divided (although sometimes entire) peristome teeth, narrow costa, phaneroporic stomata, well-developed alar cells, and differentiated perichaetial leaves the genus is placed in subfamily Dicranoideae of the Dicranaceae. Members of *Holomitrium* are generally robust, have strong, narrow, single costae, distinctly different basal and upper leaf cells, well-developed alar cells, long-sheathing perichaetial leaves, cucullate calyptrae, erect capsules, subulate-rostrate opercula, and variously divided (sometimes undivided) peristome teeth. There are recent treatments of *Holomitrium* for Mexico (Ireland, 1994) and the Caribbean (Hegewald, 1978). Allen (1990, 1994) treated six Central American species, one of which (*H. pulchellum* Mitten) he considered so polymorphic that it might represent two species. On the basis of recent field

experience, an evaluation of many new collections, and a re-evaluation of the original collections of this taxon, it now appears that *H. pulchellum* (as treated by Allen, 1990, 1994) represents two distinct species, one of which is new to science.

Holomitrium hawkinsii B. H. Allen, sp. nov.
TYPE: Honduras. Lempira: Moñtana de Cellaque, summit Cerro Mojon, 13 km SW of Gracias, 2849 m, 14°32'N, 88°41'W, Allen 12240 (holotype, MO; isotypes, NY, TEFH, US). Figure 1A–J.

A *H. pulchello* Mitten statura grandi, foliis angustis, sexu dioico, marginibus superis foliorum obscure et dissite dentatis vel spiculatis, marginibus basilibus foliorum dissite serrulatis differt.

Plants large, tufted, greenish yellow to brownish yellow, corticolous or humicolous. Stems erect to 6 cm high, branches few, irregular, simple. Leaves crowded, erect at base spreading above when wet, twisted to spirally contorted, crispate above when dry, variably undulate at margins, keeled. Leaves lanceolate from a narrowly ovate base, long, slenderly acuminate, 5–8 mm long, margins erect to narrowly recurved above, undulate, weakly and distantly serrulate at base, dentate to spiculate at middle, serrate at extreme apex, unistatose, costa strong, percurrent, upper and median leaf cells rounded, quadrate, short rectangular or oblate, 8–10 μm long, 6–14 μm wide, incrassate, cell walls straight, basal leaf cells linear, 40–100 μm long, 6–8 μm wide, incrassate and pitted, alar cells poorly developed, fugacious, upper and basal leaf cells \pm sharply demarcated. Dioicous. Male plants full-sized, perigonia terminal, with growth continued by

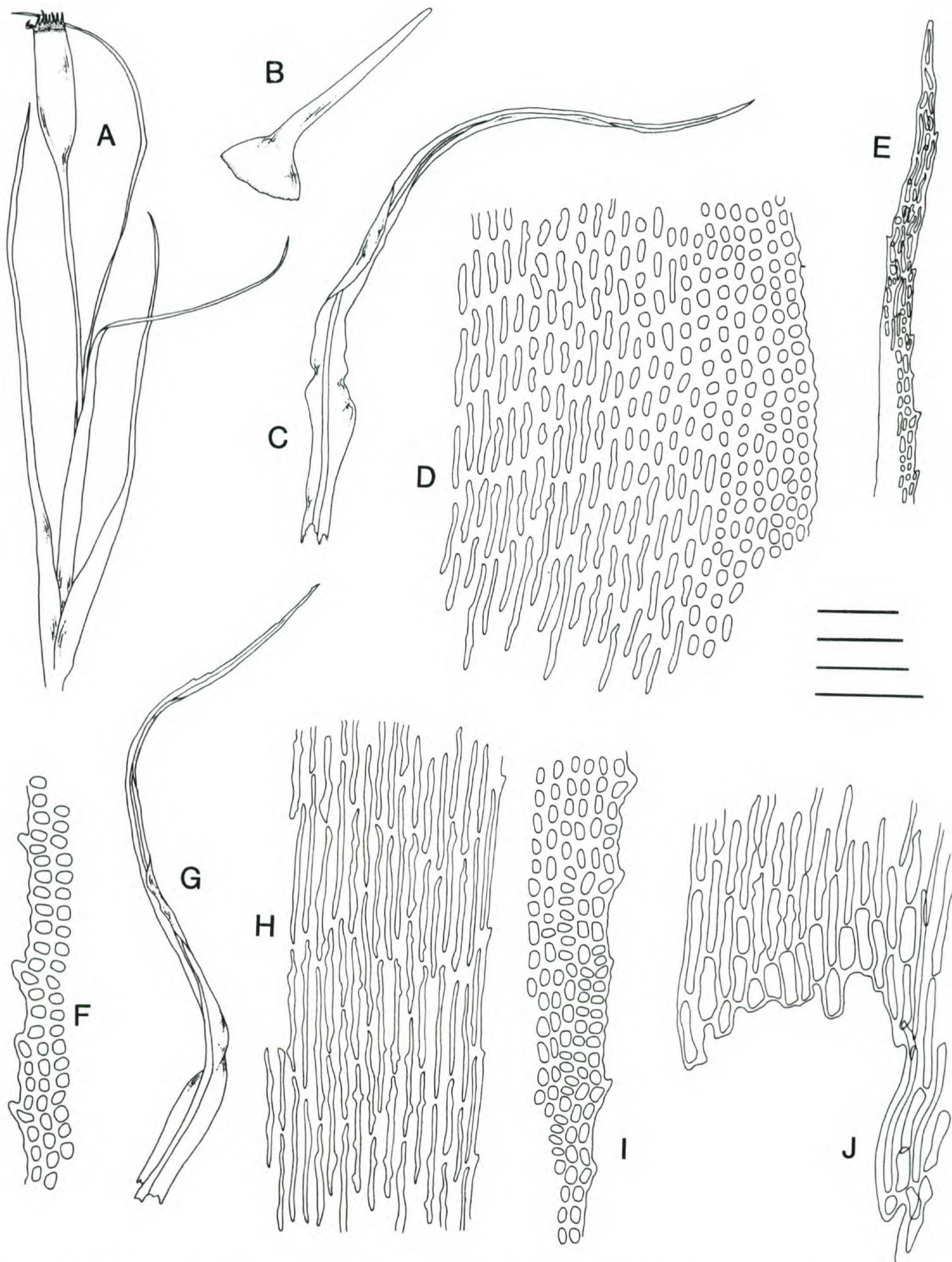


Figure 1. *Holomitrium hawkinsii* B. H. Allen. —A. Sporophyte and perichaetial leaves. —B. Operculum. —C, G. Leaves. —D. Leaf cells in region of transition between upper and basal cells. —E. Leaf apex. —F, I. Mid-leaf margins. —H. Basal leaf cells. —J. Basal cells in alar region showing gap left by fugacious alar cells. Scales in mm: top = 0.05 (D, F, H, I, J); top = 0.1 (E); subtop = 1.0 (A); subbottom = 0.5 (B); bottom = 0.5 (C, G). Drawn by the author.

subterminal branching, the stems appearing forked. Perichaetial leaves sheathing, often over-topping the capsule. Setae to 14 mm long, yellow. Opercula subulate-rostrate, 2–2.5 mm long. Capsules erect, cylindrical, 2–3 mm long, mostly yellow with 6–8 rows of red, oblong, thick-walled cells at mouth. Stomata phaneroporic, in capsule neck. Peristome haploledipous, teeth 16, dorsal (outer) surface bright red, ventral (inner) surface yellow, papillose throughout, entire, fenestrate, or distal 2/3 irregularly divided. Spores 12–16 μm , lightly roughened. Calyptra cucullate, smooth, 3 mm long.

Etymology. The specific epithet *hawkinsii* is given in honor of Thomas Edward Hawkins, friend and field companion in Honduras and Belize.

Distribution. Honduras (Cortés, Lempira, San Bárbara); Costa Rica (Heredia, Puntarenas); Panama (Chiriquí).

Habitat. On tree trunks (e.g., *Cupressus*, *Quercus*) and on humus and roots of epiphytic plants in tree crowns and upper branches; 1350–2849 m.

Holomitrium hawkinsii is a robust, dioicous species with long, slender leaves that are spirally contorted when dry. The leaf margins are sinuate and distantly obscurely dentate to spiculose in the middle to upper parts but distantly serrulate at base. The alar cells are poorly developed and fugacious with most of the cells remaining on the stem when the leaves are stripped off. The basal leaf cells are narrowly linear, incrassate and porose while the upper leaf cells are shortly rectangular, quadrate or oblate with incrassate but straight walls. Although the distinction between the upper and basal cells is sharp, as in *H. arboreum* Mitten, the quadrate upper leaf cells extend downward along the margins into the basal region farther than those near the costa. In overall aspect it resembles several of the long, slender-leafed *Macromitrium* species commonly found at higher elevations in Central America. But those species of *Macromitrium*, which is pleurocarpous and belongs in the diplolepidous series of mosses, generally have tuberculate basal leaf cells and somewhat smaller, less thickened upper leaf cells.

Perhaps the most interesting feature of *H. hawkinsii* is its regular dioicous sexual condition, i.e., with full-sized male and female plants. This represents the first report of full-sized males in *Holomitrium*, an otherwise pseudautoicous (i.e., with dwarf males) genus. The peristome of *H. hawkinsii* is also distinctive in the variable development of the peristome teeth. On a single capsule the teeth can be entire, fenestrate, or irregularly divided in the upper 2/3.

Within *Holomitrium* there are two major species groups: those with sharply serrate and those with entire upper leaf margins. The leaf margins of *H. hawkinsii*, which are sinuate and have small, weak, distantly spaced teeth, are intermediate to these two groups. From *H. pulchellum* it differs in its sexual condition, larger plant and setae size, more slender leaves that are more spirally contorted, its dentate to spiculose upper leaf margins, and serrulate basal leaf margins. In plant size and aspect it resembles *H. sinuosum* B. H. Allen, and that species sometimes has weak and distantly spaced dentate to spiculose upper leaf margins. However, that species has strongly porose and sinuose cells throughout the leaf with little or no differentiation between the upper and basal cells, a pseudautoicous sexual condition, and well-developed, persistent alar cells. All other species of *Holomitrium* in Central America differ from *H. hawkinsii* in having sharply serrate leaf margins and a pseudautoicous sexual condition.

Holomitrium aberrans Frahm has recently been described from the nearby Chocó region of Colombia (Frahm, 1994). This species is especially critical to an understanding of the *Holomitrium/Eucamptodontopsis/Schliephackea* complex, since it exhibits features of all three genera. It differs from *H. hawkinsii* in having sharply serrate leaf margins and long rectangular upper leaf cells.

Paratypes. HONDURAS. **Cortés:** Cusuco National Park, from Rio Cusuco to summit of Cerro Jilincó, ca. 22 km W of San Pedro Sula, 16 km S of Cuymel, 1600–2242 m, 15°31'N, 88°14'W, *Allen 14260* (MO, TEFH). **Lempira:** Montaña de Celaque, along ridge to summit of Cerro la Castilla, 2650 m, 14°33'N, 88°41'W, *Allen 11572* (MO, TEFH). **Santa Bárbara:** E slope of Mt. Santa Bárbara, trail to minor peak, ca. 7 km N of El Mochito, 2640 m, 14°55'N, 88°07'W, *Allen 11677* (MO, TEFH). COSTA RICA. **Heredia:** vicinity of Vara Blanca, 1880 m, *Croat 35551A* (MO). **Puntarenas:** along road between Santa Elena and Monteverde, ca 2.5 mi. from Santa Elena–Monteverde junction near E edge of Monteverde reserve, 1350 m, *Croat 47132* (MO). PANAMA. **Chiriquí:** Cerro Colorado, 4.3 mi. above Chami Camp, 1500 m, 8°35'N, 81°45'W, *Allen 5418* (MO, NY, PMA, US).

KEY TO THE SPECIES OF *HOLOMITRIUM* IN CENTRAL AMERICA

- 1a. Leaf margins entire or sinuate below, serrate at extreme apex 2
- 1b. Leaf margins sharply serrate or distantly and weakly dentate to spiculose from below midleaf to the apex 3
- 2a. Upper leaf cells quadrate with straight or wavy walls; basal leaf cells strongly differentiated from upper cells; setae 5–10 mm long *H. pulchellum* Mitten
- 2b. Upper leaf cells elongate with sinuose walls;

- basal leaf cells grading into upper cells; setae 10–15 mm long . . . *H. sinuosum* B. H. Allen
- 3a. Leaf margins distantly and weakly dentate to spiculate from below midleaf to the apex; plants dioicous with full-sized males
 *H. hawkinsii* B. H. Allen
- 3b. Leaf margins sharply serrate from below midleaf to the apex; plants pseudautoicous with dwarf males 4
- 4a. Quadrate upper leaf cells extending downward along the margins into the basal region; leaf cells at basal margins quadrate to rectangular, wider than the inner basal cells, and weakly to not porose *H. arboreum* Mitten
- 4b. All quadrate upper leaf cells ending at same level in the lower leaf; leaf cells at basal margins elongate to linear, narrower than the inner basal cells and porose 5
- 5a. Upper leaf cells elongate, the outer cell walls sinuose *H. terebellatum* C. Müller
- 5b. Upper leaf cells quadrate with straight cell walls 6
- 6a. Upper leaves over 10 mm long, oblong at base, gradually narrowed to the apex, unistratose throughout; deciduous branchlets absent *H. longifolium* Hampe
- 6b. Upper leaves less than 7 mm long, oblong-ovate at base, abruptly narrowed from base,

bistratose at margins and medially in rows; occasionally with clusters of deciduous branchlets at apex
 *H. williamsii* E. B. Bartram

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